

IN THE CLAIMS:

Please amend claims 42-44, 50-52, and 58-60, as set forth below.

Claims 1-36 (Canceled)

1 37. (Previously Presented) A thermal management system for an integrated
2 circuit die comprising:
3 a temperature sensor formed directly on the die, the temperature sensor having an output;
4 a power modulation element formed directly on the die, the power modulation element to
5 reduce power consumption of the die in response to the output of the temperature
6 sensor;
7 a control element formed directly on the die, the control element including at least one
8 register to provide an enable/disable bit for the thermal management system; and
9 a visibility element formed directly on the die, the visibility element to indicate a status of
10 the output of the temperature sensor.

1 38. (Previously Presented) The thermal management system of claim 37,
2 wherein the temperature sensor comprises:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 39. (Previously Presented) The thermal management system of claim 38,
2 further comprising a pulse dampener coupled to the first signal line, the pulse dampener
3 to at least partially remove electrical noise from the reference voltage.

1 40. (Previously Presented) The thermal management system of claim 38,
2 further comprising an analog filter coupled to the second signal line and the first signal
3 line, the analog filter to detect voltage spikes present in the reference voltage and to add
4 substantially identical voltage spikes to the programmable voltage.

1 41. (Previously Presented) The thermal management system of claim 38,
2 further comprising a digital filter coupled to an output of the comparator, the digital filter
3 including an up-down counter to count clock pulses, the up-down counter to increment
4 once for each clock pulse detected when the comparator output is at a first state and to
5 decrement once for each clock pulse detected when the comparator output is at a second
6 state.

1 42. (Currently Amended) The thermal management system of claim 37, the
2 control element further including at least one of register selected from a group consisting
3 of a register to selectively disengage a specified portion of the thermal management
4 system, a register to enable the thermal management system in response to an occurrence
5 of an external event, a register to force the thermal management system active while
6 overriding a disable bit provided by the at least one register, and a register to allow
7 external software and hardware to enable the thermal management system.

1 43. (Currently Amended) The thermal management system of claim 37, the
2 visibility element including at least one of device selected from a group consisting of a
3 register to indicate the status of the temperature sensor output, a register to provide a
4 sticky bit, a counter to count a number of lost clock cycles resulting from operation of the
5 thermal management system, and circuitry to generate an interrupt when the temperature
6 sensor output transitions to a different state.

1 44. (Currently Amended) The thermal management system of claim 37, the
2 power modulation element to reduce the power consumption of the die by performing at
3 least one of action selected from a group consisting of lowering a supply voltage to the
4 die, lowering a frequency of a clock signal provided by internal clock circuitry on the die,
5 performing clock gating of the clock signal, performing clock throttling of the clock
6 signal, selectively blocking clock pulses of the clock signal, disabling at least one of a
7 plurality of functional units on the die, limiting instructions sent to at least one of the
8 plurality of functional units, and changing a behavior of at least one of the plurality of
9 functional units.

1 45. (Previously Presented) An apparatus comprising:
2 a die; and
3 a thermal management system formed directly on the die, the thermal management
4 system including
5 a temperature sensor, the temperature sensor having an output;
6 a power modulation element to reduce power consumption of the die in
7 response to the output of the temperature sensor;
8 a control element including at least one register to provide an
9 enable/disable bit for the thermal management system; and
10 a visibility element to indicate a status of the output of the temperature
11 sensor.

1 46. (Previously Presented) The apparatus of claim 45, wherein the
2 temperature sensor comprises:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 47. (Previously Presented) The apparatus of claim 46, further comprising a
2 pulse dampener coupled to the first signal line, the pulse dampener to at least partially
3 remove electrical noise from the reference voltage.

1 48. (Previously Presented) The apparatus of claim 46, further comprising an
2 analog filter coupled to the second signal line and the first signal line, the analog filter to
3 detect voltage spikes present in the reference voltage and to add substantially identical
4 voltage spikes to the programmable voltage.

1 49. (Previously Presented) The apparatus of claim 46, further comprising a
2 digital filter coupled to an output of the comparator, the digital filter including an up-
3 down counter to count clock pulses, the up-down counter to increment once for each
4 clock pulse detected when the comparator output is at a first state and to decrement once
5 for each clock pulse detected when the comparator output is at a second state.

1 50. (Currently Amended) The apparatus of claim 45, the control element
2 further including at least one ~~of~~ register selected from a group consisting of a register to
3 selectively disengage a specified portion of the thermal management system, a register to
4 enable the thermal management system in response to an occurrence of an external event,
5 a register to force the thermal management system active while overriding a disable bit
6 provided by the at least one register, and a register to allow external software and
7 hardware to enable the thermal management system.

1 51. (Currently Amended) The apparatus of claim 45, the visibility element
2 including at least one ~~of~~ device selected from a group consisting of a register to indicate
3 the status of the temperature sensor output, a register to provide a sticky bit, a counter to
4 count a number of lost clock cycles resulting from operation of the thermal management
5 system, and circuitry to generate an interrupt when the temperature sensor output
6 transitions to a different state.

1 52. (Currently Amended) The apparatus of claim 45, the power modulation
2 element to reduce the power consumption of the die by performing at least one ~~of~~ action
3 selected from a group consisting of lowering a supply voltage to the die, lowering a
4 frequency of a clock signal provided by internal clock circuitry on the die, performing
5 clock gating of the clock signal, performing clock throttling of the clock signal,
6 selectively blocking clock pulses of the clock signal, disabling at least one of a plurality
7 of functional units on the die, limiting instructions sent to at least one of the plurality of
8 functional units, and changing a behavior of at least one of the plurality of functional
9 units.

1 53. (Previously Presented) A system comprising:
2 a memory coupled with a bus; and
3 a processor coupled with the bus, the processor including a die and a thermal
4 management system formed directly on the die, the thermal management system
5 including
6 a temperature sensor, the temperature sensor having an output;
7 a power modulation element, the power modulation element to reduce
8 power consumption of the processor in response to the output of
9 the temperature sensor;
10 a control element, the control element including at least one register to
11 provide an enable/disable bit; and
12 a visibility element, the visibility element to indicate a status of the output
13 of the temperature sensor.

1 54. (Previously Presented) The system of claim 53, the at least one
2 temperature sensor comprising:
3 a reference voltage source providing a reference voltage;
4 a programmable voltage source providing a programmable voltage proportional to a
5 temperature of the die; and
6 a comparator having one input coupled via a first signal line to the reference voltage
7 source and another input coupled via a second signal line to the programmable
8 voltage source, the comparator to provide a signal at the output of the temperature
9 sensor in response to the programmable voltage substantially equaling the
10 reference voltage.

1 55. (Previously Presented) The system of claim 54, further comprising a pulse
2 dampener coupled to the first signal line, the pulse dampener to at least partially remove
3 electrical noise from the reference voltage.

1 56. (Previously Presented) The system of claim 54, further comprising an
2 analog filter coupled to the second signal line and the first signal line, the analog filter to
3 detect voltage spikes present in the reference voltage and to add substantially identical
4 voltage spikes to the programmable voltage.

1 57. (Previously Presented) The system of claim 54, further comprising a
2 digital filter coupled to an output of the comparator, the digital filter including an up-
3 down counter to count clock pulses, the up-down counter to increment once for each
4 clock pulse detected when the comparator output is at a first state and to decrement once
5 for each clock pulse detected when the comparator output is at a second state.

1 58. (Currently Amended) The system of claim 53, the control element further
2 including at least one ~~of~~ register selected from a group consisting of a register to
3 selectively disengage a specified portion of the thermal management system, a register to
4 enable the thermal management system in response to an occurrence of an external event,
5 a register to force the thermal management system active while overriding a disable bit
6 provided by the at least one register, and a register to allow external software and
7 hardware to enable the thermal management system.

1 59. (Currently Amended) The system of claim 53, the visibility element
2 including at least one ~~of~~ device selected from a group consisting of a register to indicate
3 the status of the temperature sensor output, a register to provide a sticky bit, a counter to
4 count a number of lost clock cycles resulting from operation of the thermal management
5 system, and circuitry to generate an interrupt when the temperature sensor output
6 transitions to a different state.

1 60. (Currently Amended) The system of claim 53, the power modulation
2 element to reduce the power consumption of the processor by performing at least one of
3 action selected from a group consisting of lowering a supply voltage to the die, lowering
4 a frequency of a clock signal provided by internal clock circuitry on the die, performing
5 clock gating of the clock signal, performing clock throttling of the clock signal,
6 selectively blocking clock pulses of the clock signal, disabling at least one of a plurality
7 of functional units on the die, limiting instructions sent to at least one of the plurality of
8 functional units, and changing a behavior of at least one of the plurality of functional
9 units.